Winter 2010-2011 Outlook and Climatology for Northern Illinois and Northwest Indiana

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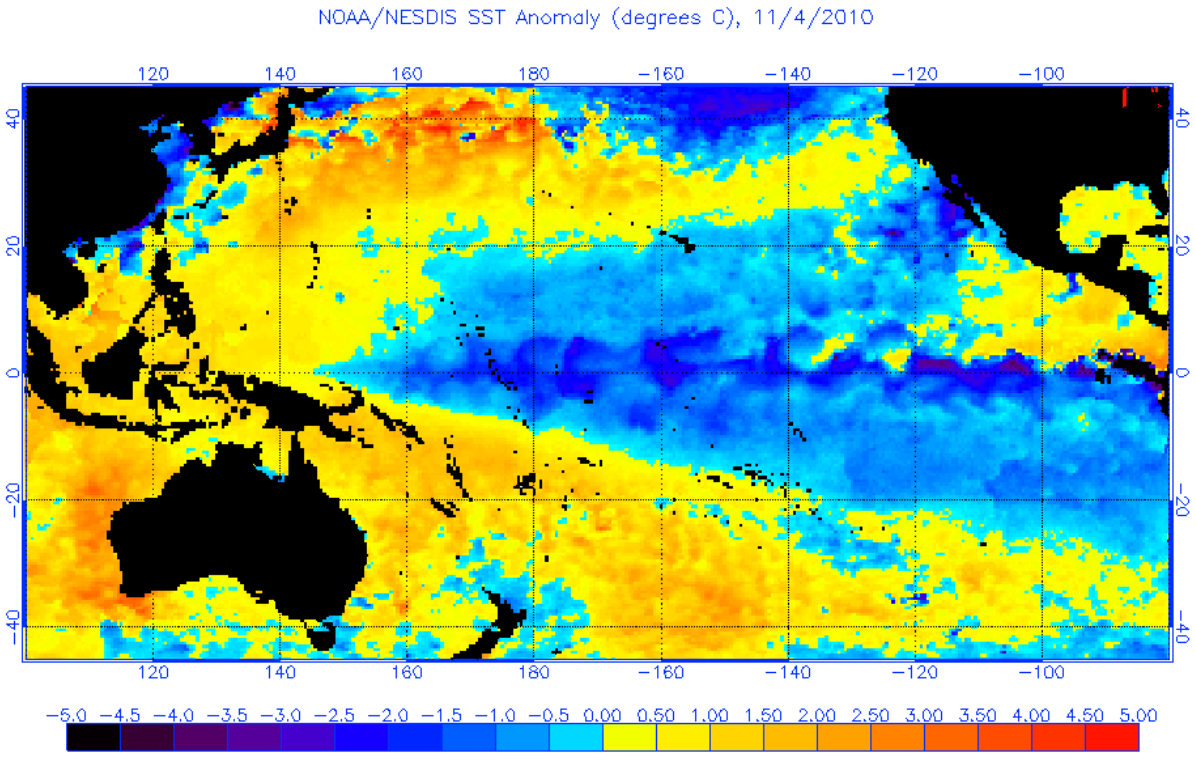
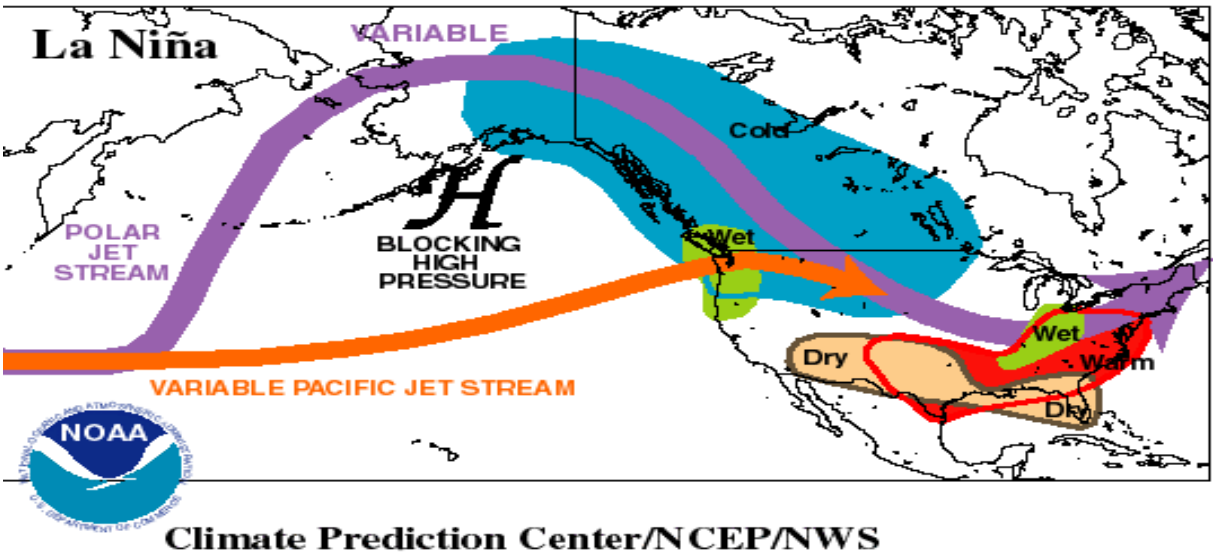
The National Weather Service's Climate Prediction Center (CPC) released their winter seasonal outlook on October 21, 2010 for the 2010-2011 winter season, December through February. The outlook issued by the CPC calls for equal chances of above or below normal temperatures (small portion of area has an elevated probability of above normal temps.) and an elevated probability of this winter being wetter than normal in Northern IL and Northwestern IN. The CPC creates these predictions based on large scale climatological factors and circulations. The dominant climate factor this winter will be a moderate to strong La Niña. A La Niña refers to below normal eastern and central Pacific equatorial waters. These waters are cooler than normal because pressure and wind patterns over the Pacific intensify which causes upwelling, which always occurs in the eastern Pacific, to become greater than normal and bring cooler Sea Surface Temperatures (SST) to the surface across the Eastern and Central Pacific. Below is the SST anomaly map for the equatorial Pacific as of 11/04/2010. The areas of purple indicate sea surface temperatures greater than 4 degrees Celsius cooler than average which are large departures from normal and thus indicative of the strengthening La Niña.



To be considered an official La Niña, SST departures must be colder than -0.5 degrees C in the Nino 3.4 Region (5°N-5°S, 120°-170°W) for 5 consecutive overlapping 3 month seasons. The most recent (Jul-Sep) average departure in this region was -1.0° Celsius which is official "moderate" Oceanic Nino Index (ONI). This value is expected to drop even more in the next few months, allowing this episode to reach strong criteria (ONI -1.5° Celsius or less), and peaking sometime between November and January before slowly weakening.

The colder Pacific SSTs alone are not the reason for changes in our weather pattern, but rather the effect of those colder waters on global circulations and the resultant effect on our weather. The diagram on the next page depicts a typical winter pattern and weather over North America during a La Niña winter. The jet stream over Western North America is amplified due to a blocking high pressure in place over the northeast Pacific. This allows cold air to spill down from Alaska and Canada into the northern Plains. This cold air stays to the North of the Jet Stream and warm moist air stays to the south. Along this temperature gradient, an active storm track occurs and Chicago is usually along this boundary. Therefore, if this pattern shifts 100 miles west or east, it can be the difference in Chicago seeing cold temperatures and snow,

or seeing warm temperatures and even the potential for thunderstorms.



Specifically, for Northern IL and Northwestern IN, La Niña winters are highly variable with record warmth and record cold sometimes occurring in the same winter. The table below shows La Niña winters at Chicago O'Hare. The results show that 70 percent of La Niña winters have seen above normal temperatures, and 60 percent of La Niña winters have seen above normal precipitation. Also, 55 percent of La Niña winters have resulted in above normal snowfall.

La Niña Winters at Chicago-O'Hare

Winter	Avg Temp (°F)	Precip (inches)	Snow (inches)	Dec-Feb ONI
1949-1950	29.2	13.79	24.9	-1.7
1950-1951	23.5	7.13	40.1	-1
1954-1955	28.5	5.11	21.2	-1
1955-1956	27.9	3.16	16.5	-1.3
1956-1957	28.3	5.09	24.3	-0.5
1962-1963	19.2	1.85	36.6	-0.6
1964-1965	26.4	7.72	36.4	-0.8
1967-1968	27.2	6.44	20.3	-0.7
1970-1971	26.3	5.21	22.0	-1.3
1971-1972	28.2	7.96	26.7	-0.7
1973-1974	26.5	9.42	54.2	-1.9
1974-1975	28.7	8.32	32.6	-0.6
1975-1976	29.1	6.05	30.3	-1.6
1984-1985	21.9	7.86	38.8	-0.9
1988-1989	26.6	3.99	20.5	-1.7
1995-1996	25.2	2.88	16.1	-0.7
1998-1999	30.4	7.31	32.5	-1.4
1999-2000	29.8	6.00	28.7	-1.6
2000-2001	22.2	5.80	34.6	-0.6
2007-2008	24.8	8.95	52.1	-1.4
Avg	26.5	6.50	30.5	
Median	26.9	6.25	29.5	
1971-2000 Normal	25.5	5.81	28.3	
% Above Normal	70	60	55	
% Below Normal	30	40	45	
top-10 highest				
top-10 lowest				

In conclusion, most La Niña winters in Chicago are warmer, wetter, and snowier than normal. Temperatures are slightly above normal, but still remain cold enough to snow. Large temperature swings are possible throughout the winter with outbreaks of arctic air and some episodes of unseasonably warm weather and thunderstorms. In fact, almost 68 percent of all severe weather reports within Chicago's County Warning Area (CWA) have occurred during La Nina winters. Most recently, an EF-3 tornado impacted Boone and McHenry counties in Illinois on January 7, 2008 (a record high of 65^{o} F was set at Chicago O'Hare that day). 2007-2008 was a moderate La Niña. This is due to the configuration of jet streams being more conducive to severe weather outbreaks when we are in the warm sector. The actual results of the upcoming 2010-2011 winter will depend on the delicate balance between the ongoing La Niña and other atmospheric circulations. Regardless, put your seat belt on, this winter could be a bumpy ride, especially if the near record-setting storm of 10/26-27 is any indication of what weather we may experience.